

REMARKS

Claims 1, 5, 11-13, and 19-20 have been amended, and claims 4, 23-24, 27-28, and 31-32 have been cancelled. Claims 1-3, 5-22, 25-26, 29-30, and 33-34 are pending, with claims 1, 11, 13, and 19-20 being independent.

Attached hereto is an Appendix entitled "Version with Markings to Show Changes Made" which is a marked-up version of the portions of the application which have been amended by the present amendment, with brackets indicating deleted matter and underlining indicating added matter.

The indication that claims 11 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, is acknowledged.

Claims 11 and 19 have been rewritten in independent form as suggested by the Examiner. Accordingly, it is submitted that claims 11 and 19 are now in condition for allowance, and an indication to that effect is respectfully requested.

Claims 4, 12, 23, 27, and 31 were rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicants regard as the invention for the reasons set forth on page 2 of the Office Action of May 24, 2002.

The rejection of claims 4, 23, 27, and 31 has rendered moot by the cancellation of claims 4, 23, 27, and 31.

Claim 12 has been amended to eliminate the deficiencies identified by the Examiner on page 2 of the Office Action of May 24, 2002, and it is submitted that claim 12 is now in compliance with 35 USC 112, second paragraph. Accordingly, it is respectfully requested that the rejection of claim 12 under 35 USC 112, second paragraph, be withdrawn.

Claim 12 was not rejected over the prior art, but was only rejected under 35 USC 112, second paragraph. Since this rejection is considered to have been overcome as discussed above, it is submitted that claim 12 is now in condition for allowance except for its dependency from rejected base claim 1, and an indication to that effect is respectfully requested.

Claims 25-26, 29-30, and 33-34 were rejected under 35 USC 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention for the reasons set forth on page 3 of the Office Action of May 24, 2002.

However, it is submitted that the feature of claims 25, 29, and 33 referred to by the Examiner on page 3 of the Office Action of May 24, 2002, is described, for example, on page 39, lines 2-5, of the substitute specification submitted with the preliminary amendment of June 22, 1999.

Furthermore, it is submitted that the feature of claims 26, 30, and 34 referred to by the Examiner on page 3 of the Office Action of May 24, 2002, is

described, for example, on page 10, lines 18-20; page 39, lines 2-11; and page
41, line 21, through page 43, line 17, of the substitute specification.

It is noted that in Fig. 1, the major axis of the pixel is perpendicular to the plane of the figure and thus is parallel to the grooves on waveguide 53, and that the minor axis of the pixel is parallel to the plane of the figure and thus is perpendicular to the grooves of waveguide 53.

For the reasons discussed above, it is submitted that the subject matter of claims 25-26, 29-30, and 33-34 is in fact described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention as required by 35 USC 112, first paragraph. Accordingly, it is respectfully requested that the rejection of claims 25-26, 29-30, and 33-34 under 35 USC 112, first paragraph, be withdrawn.

Claims 25-26, 29-30, and 33-34 were not rejected over the prior art, but were only rejected under 35 USC 112, first paragraph. Since this rejection is considered to have been overcome as discussed above, it is submitted that claims 25-26, 29-30, and 33-34 are now in condition for allowance except for their dependency from rejected base claims 1, 13, and 20, and an indication to that effect is respectfully requested.

Claims 1-7, 10, 13-14, 17-18, 20, 22-24, 27-28, and 31-32 were rejected under 35 USC 103(a) as being unpatentable over "the Applicant admitted prior art" in view of Gunjima et al. (Gunjima) (U.S. Patent No. 5,587,816).

Claims 8, 15, and 21 were rejected under 35 USC 103(a) as being unpatentable over "the Applicant admitted prior art" in view of Gunjima and Yuuki et al. (Yuuki) (U.S. Patent No. 6,147,725).

Claims 9 and 16 were rejected under 35 USC 103(a) as being unpatentable over "the Applicant admitted prior art" in view of Gunjima and Wortman et al. (Wortman) (U.S. Patent No. 6,101,032).

The rejection of claims 4, 23-24, 27-28, and 31-32 has been rendered moot by the cancellation of claims 4, 23-24, 27-28, and 31-32.

The rejections of claims 1-3, 5-10, 13-18, and 20-22 are respectfully traversed insofar as they may be deemed to be applicable to claims 1-3, 5-10, 13-18, and 20-22 in their present form, it being noted that the features of cancelled claims 23-24, 27-28, and 31-32 have been incorporated into independent claims 1, 13, and 20 from which cancelled claims 23-24, 27-28, and 31-32 depended.

Independent claims 1, 13, and 20 now recite, inter alia, a light control element arranged at a projected light side of the illumination device and a reflective polarizer arranged at an upper portion of the light control element so that a polarized light transmission axis of the reflective polarizer is adjusted so as to be substantially perpendicular or substantially parallel to a control axis of the light control element, wherein the light control element is the only light control element arranged between the illumination device and the reflective polarizer.

It is submitted that the Applicant admitted prior art", Gunjima, Yuuki, and Wortman do not disclose or suggest the combination of a light control element arranged at a projected light side of the illumination device and a reflective polarizer arranged at an upper portion of the light control element so that a polarized light transmission axis of the reflective polarizer is adjusted so as to be substantially perpendicular or substantially parallel to a control axis of the light control element, wherein the light control element is the only light control element arranged between the illumination device and the reflective polarizer, as now recited in independent claims 1, 13, and 20.

Since "the Applicant admitted prior art", Gunjima, Yuuki, and Wortman do not disclose or suggest the features of independent claims 1, 13, and 20 discussed above, it is submitted that independent claims 1, 13, and 20 and claims 2-3, 5-10, 14-18, and 21-22 depending therefrom patentably distinguish over "the Applicant admitted prior art", Gunjima, Yuuki, and Wortman in the sense of 35 USC 103(a), and it is respectfully requested that the rejections of claims 1-3, 5-10, 13-18, and 20-22 under 35 USC 103(a) as being unpatentable over "the Applicant admitted prior art", Gunjima, Yuuki, and Wortman be withdrawn.

Although dependent claims 2-3, 5-10, 14-18, and 21-22 are considered to be allowable by virtue of their dependency from allowable independent claims 1, 13, and 20, it is noted that these dependent claims also recite further features of the present invention which are not seen to be disclosed or suggested by the prior art.

As recognized by the Examiner, the other reference cited but not relied upon neither discloses nor suggests the present invention, and thus no further discussion of this other references is deemed necessary at this time.

It is submitted that all of the Examiner's objections and rejections have been overcome, and that the application is now in condition for allowance. Reconsideration of the application and an action of a favorable nature are respectfully requested.

To the extent necessary, the applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (503.36984X00).

Respectfully submitted,

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Attachment

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Changes made to the application by the present amendment are indicated below, with brackets indicating deleted matter and underlining indicating added matter.

IN THE CLAIMS

Claims 4, 23-24, 27-28, and 31-32 have been cancelled without prejudice or disclaimer of the subject matter thereof.

Claims 1, 5, 11-13, and 19-20 have been amended as follows:

- ~~5~~1. (Twice Amended) A liquid crystal display device comprising:
an illumination device;
a light control element arranged at a projected light side of the illumination device;
a reflective polarizer arranged at an upper portion of the light control element so that a polarized light transmission axis of the reflective polarizer is adjusted so as to [increase a transmission rate of projected light from the illumination device] be substantially perpendicular or substantially parallel to a control axis of the light control element;

a liquid crystal display element for controlling polarization of projected light projected from the reflective polarizer; and
a screen arranged at an upper portion of the liquid crystal display element;

wherein the light control element is the only light control element arranged between the illumination device and the reflective polarizer.--

--5. (Twice Amended) A liquid crystal display device according to claim [4] 3, wherein the screen is composed so as to absorb external light and to transmit the projected light from the illumination device.--

--11. (Twice Amended) A liquid crystal display device [according to claim 7,]
comprising:

an illumination device;
a light control element arranged at a projected light side of the illumination device;
a reflective polarizer arranged at an upper portion of the light control element so that a polarized light transmission axis of the reflective polarizer is adjusted so as to increase a transmission rate of projected light from the illumination device;

a liquid crystal display element for controlling polarization of projected light projected from the reflective polarizer; and

a screen arranged at an upper portion of the liquid crystal display element;

wherein the liquid crystal display element includes:

at least a pair of transparent substrates;

a liquid crystal layer interposed between the pair of transparent substrates; and

a pair of absorption type polarizers arranged so that the pair of transparent substrates are held between the pair of absorption type polarizers;
and

wherein a half-value width of projected light θ_1 (an angular range wherein a brightness becomes 1/2 of a peak value) from the illumination device in at least a certain direction satisfies a relationship expressed by the following equation:

$$\theta_1 \leq \sin^{-1}(n \cdot \sin(\tan^{-1}(2d/t)))$$

where

t is a thickness of each of the pair of transparent substrates,

n is a refractive index of each of the pair of transparent substrates,

and

d is a length of the pixel in a minor axis direction of the pixel.

12. (Three Times Amended) A liquid crystal display device according to claim 10, wherein the liquid crystal layer, the reflective polarizer, the absorption type polarizers, and the reflective color selective layer are arranged so that [a viewing

angle of the liquid crystal display device is broadened in a direction perpendicular to] a stripe direction of the reflective color selective layer coincides with an axis in a scattering direction of the screen.

13. (Twice Amended) A liquid crystal display device comprising:

an illumination device;

a light control element arranged at a projected light side of the illumination device;

a reflective polarizer arranged at an upper portion of the light control element so that a polarized light transmission axis of the reflective polarizer is adjusted so as to be substantially perpendicular or substantially parallel to a control axis of the light control element;

a liquid crystal display element for controlling polarization of projected light projected from the reflective polarizer so that a major axis direction of a pixel of the liquid crystal display element is arranged approximately parallel to a direction in which a linearly polarized light component of projected light projected from the illumination device is high; and

a screen arranged at an upper portion of the liquid crystal display element;

wherein the light control element is the only light control element arranged between the illumination device and the reflective polarizer.--

--19. (Twice Amended) A liquid crystal display device [according to claim 18,] comprising:

an illumination device;

a light control element arranged at a projected light side of the illumination device;

a reflective polarizer arranged at an upper portion of the light control element;

a liquid crystal display element for controlling polarization of projected light projected from the reflective polarizer so that a major axis direction of a pixel of the liquid crystal display element is arranged approximately parallel to a direction in which a linearly polarized light component of projected light projected from the illumination device is high; and

a screen arranged at an upper portion of the liquid crystal display element;

wherein the liquid crystal display element includes:

at least a pair of transparent substrates;

a liquid crystal layer interposed between the pair of transparent substrates; and

a pair of absorption type polarizers arranged so that the pair of transparent substrates are held between pair of absorption type polarizers; and

wherein a half-value width of projected light θ_1 (an angular range wherein a brightness becomes 1/2 of a peak value) from the illumination device

in at least a certain direction satisfies a relationship expressed by the following equation:

$$\theta_1 \leq \sin^{-1}(n \cdot \sin(\tan^{-1}(2d/t)))$$

where

t is a thickness of each of the pair of transparent substrates,

n is a refractive index of each of the pair of transparent substrates,

and

d is a length of the pixel in a minor axis direction of the pixel.

20. (Twice Amended) A liquid crystal display device comprising:

an illumination device;

a light control element arranged at a projected light side of the illumination device;

a reflective polarizer arranged at an upper portion of the light control element so that a polarized light transmission axis of the reflective polarizer is [arranged so that a rate of transmission of polarized light projected from the illumination device is increased] so that a polarized light transmission axis of the reflective polarizer is adjusted so as to be substantially perpendicular or substantially parallel to a control axis of the light control element;

a liquid crystal display element for controlling polarization of projected light projected from the reflective polarizer so that a major axis direction of a pixel of the liquid crystal display element is arranged

approximately parallel to a direction in which a linearly polarized light component of the polarized light projected from the illumination device is high; and
a screen arranged at an upper portion of the liquid crystal display element;

wherein the light control element is the only light control element
arranged between the illumination device and the reflective polarizer.--